

Museums on paper: library & manuscript resources

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SUMMARY

A natural history museum collection typically houses a great deal of paper-based material (additional to specimen labels) that may directly or indirectly relate to specimen material in its own, or other, establishments. This material may be of great value to the study of natural history and the promotion of conservation. Amongst the documentation most useful in ornithology are field and museum labels, field notes and reports, itineraries, diaries, letters, stock books, annotations in catalogues, and captive breeding records. Among the figurative materials of great potential value are field sketches, drawings and photographs, any of which may relate to the history of a specimen, species or habitat. We exemplify these uses and values, drawing on cases involving mainly rare or extinct species (in order of appearance: *Vanellus macropterus*, *Amaurocichla bocagei*, *Diaphorapteryx hawkinsi*, *Psephotus pulcherrimus*, *Pinguinus impennis*, *Cistothorus platensis*, *Calidris ferruginea*, *Haliaeetus albicilla*, *Melopsittacus undulatus*, *Rhodonessa caryophyllacea*, *Sceloglaux albifacies*, *Rallus nigra*, *Janthoenas godmani*, *Cuculus poliocephalus*, *Sitta longirostris* and *Tympanuchus cupido*). However, paper-based museum resources also have great potential for such studies as those which help delineate the extent and nature of population declines in common birds. These resources need to be better known by and more accessible to scholars.

Introduction

Most people think of museums solely as repositories for three-dimensional specimens (such as Greek pots, Roman coins or bird skins) and two-dimensional works of art on canvas and paper. In fact, there are many other items on paper that are just as important to preserve. Museums—including natural history museums—often house considerable collections of paper-based material. These collections can be broadly divided into archival matter (paper which the institution itself has produced, such as foundation documents, stock books, correspondence files, biographical information, photographic records of staff and events, records of financial matters), manuscripts (written items considered worth preserving in their own right) and works of art on paper. Large museums (such as the Natural History Museum in London, the Australian Museum in Sydney, or Naturalis in Leiden) have large departments of library and archive services to look after such material, and the curatorial staff regard these departments as a core function of their institution.

The preservation of original paper-based material relating to ornithology—whether writing, picture or photograph—is just as important as biological material for the study, particularly historical, of birds. Such records are especially useful for the safe keeping of knowledge about those species that are now extinct or endangered, and in many cases provide the only record of extinct species. All biological bird material is to a considerable degree devalued if it is dissociated from originally accompanying (or, indeed, subsequently provided) written, drawn or photographic

material. In this paper we identify and illustrate some of the types of contribution to ornithology and conservation made by the paper archives maintained by museums.

Written material

Amongst the written materials most useful in ornithology are: field and museum labels, field notes and reports, itineraries, diaries, letters, stock books and annotations in catalogues, and captive breeding records. In this essay we largely assume the crucial importance of ensuring the permanent attachment and good condition of original specimen labels as a means of verifying and evaluating specimen material, but we do allude to cases which demonstrate this particular truth. It is also to be noted that the preservation and improvement of label *condition* are well worthy of the close attention of the museum curatorial community. We also assume the obvious necessity of regarding biological field records as specimens in their own right, and would like to emphasise that when these are on computer, rather than on file cards, it is nevertheless both practical and precautionary to keep hard copies, since members of the public may not always have computer access at the time of their visit. Furthermore, we assume that the need for an accurate and detailed paper catalogue or register of all specimen material in a particular institution is acknowledged and understood (although it is apparent that the development of such documents into computerised format remains a challenge of very considerable dimensions, as it does for other paper-based materials). For the most part we use this essay to furnish some noteworthy examples of how paper-based materials have yielded significant pieces of information in ornithology.

Field notes, 1: Bartels on the Javan Lapwing

Max E. G. Bartels was a plantation owner on Java who had a great love of birds both in the wild and in the aviary. His detailed field notebooks, written between 1915 and 1931, are held in the Rijksmuseum van Natuurlijke Historie (Naturalis), Leiden, the Netherlands. Bartels's notes include an account of the Javan Lapwing *Vanellus macropterus*, which is possibly now extinct. This is the only known field description of the species, without which absolutely nothing would otherwise be known about it in the living state. This account has been recently published (Collar *et al.* 2000) but some extracts follow:

Xiphidiopterus cucullatus, Temm.

The area of distribution of this Spurred Lapwing in Java is very restricted ... found ... only in the extensive steppe-like swamps of the Sedari estuary and its tributaries, as well as... in the lowlands of the Tjitaroem delta and at Rawah Tangerang... [where] it is an everyday sight, impossible to miss... As they are clever and very cautious birds, they never dive-bomb people but instead they generally 'create a stink' at an appropriate distance... During the east monsoon... they undoubtedly prefer the patches where [Teki] grasses stay moist the longest... During the rainy season the birds keep to areas in the swamps which are relatively little flooded, since despite their long legs they prefer not to walk in open water

Field notes, 2: Correia and the São Tomé Short-tail

When working on *Threatened birds of Africa and related islands* (Collar & Stuart 1985), N. J. Collar noticed that David Bannerman, in *Birds of the Atlantic islands*, made repeated reference to notes on species made by J. G. Correia during collecting work he undertook for the American Museum of Natural History on the Azores and Cape Verdes. In 1928–1929 Correia had also collected on the islands of São Tomé and Príncipe (Amadon 1953)—islands of immense importance to conservation yet in the early 1980s still virtually unknown biologically—so Collar (verbally 1999) made inquiries at AMNH whether Correia had left any notes there on his work. Initially Mary LeCroy was unable to find anything, but eventually a typescript came to light in Dean Amadon's desk and was copied to Collar for his use. The value of this typescript is to some extent limited by the fact that Correia, understandably, was not entirely sure of what he was seeing, and so named the birds he saw in accordance with his sense of what they might be ('Yellow-bellied Flycatcher' and so on). Nevertheless, once these names can be identified with complete confidence, by relating dates in the typescript to dates on specimen labels, the manuscript has great potential to illuminate species' former abundance and habits.

Perhaps the most remarkable entry in the typescript concerns *Amaurocichla bocagei*, to which Collar & Stuart (1985) gave the name São Tomé Short-tail, since no-one then was very sure what it was (although the Abbé René de Naurois had just sent Collar a manuscript in which he proposed the *possibility* that the species was the Old World's only furnariid). At the time of Correia's visit, the bird was only known from three nineteenth-century specimens, and it was only by obtaining the dates of the specimens Correia collected and matching them to his notebook entries that it was possible to identify the subject of the entry. His entry for 4 December 1928 (reproduced exactly as typed) show that the bird did indeed present a striking problem of taxonomic placement:

No rain in the morning but dark weather; I went up to the Obó (forest) for my good luck I found two new birds to-day Rail. a new bird for me and for the residents of these part of the island which told me that they as never seen such bird yet. The Rail is a very small bird the back is dully brown and the belly is ruffs brown very shirt tail but litle long legs with long toe too. I found its on the creek quite at the head of the Rio Quija, its was on the small stones in the centre of the creek looking for some thing among the sand, when I shot the first an other took a short flight and restd on a dry limb right among the stones so I shot it too. Its were male and famely. I shot one Yellow-belly, one Ossobo, and three large honey-eaters all in the Obó excpet the Ossobo.

Of course the species is *not* a rail (it appears to be an aberrant sylviid). However, Correia's observations of its rail-like behaviour were an important insight into its ecology and helped guide researchers when they became the first people since Correia (and, at that time, the only others last century) to see the species in the wild (Atkinson *et al.* 1991).

Itineraries

It is obviously imperative for collectors to keep accurate records of where and when specimens were collected in the field, and that these data are permanently attached to the specimen. Eighteenth- and nineteenth-century specimens on the whole lack this depth of information, and it is often only by recourse to original diaries and expedition reports that information can be reunited with specimens. Conversely, labels with data can be very usefully employed to create a diary for an explorer where this does not exist, or has been lost. In the Victorian period, in particular, the custom was for dispersal of specimens from a particular expedition to museums around the world (in essence to whomsoever would pay for them). Databasing the locality and dates on these specimens, after searching them out in the many museums which contain good Victorian natural history collections, can give unexpectedly positive results. These are not only of biographical interest: Australians, for instance, have found the database and itinerary compiled by the Liverpool Museum about John Gilbert's travels in Australia between 1838 and 1845 (housed in computer form, as a card index and as numerous notes and photocopies, which indeed fill the shelves of one whole office) essential for confirming exactly where he had collected some of his rarest species (see below). In many cases a specimen with a missing or obscured collecting date can be checked against another with the same locality; conversely specimens with dates but no localities can be reunited with place names when compared to other specimens collected on the same day (Fig. 2).

Rasmussen & Prÿs-Jones (2003, this issue) also refer (in their section 'Label substitution') to the use archival material can make in determining provenance of suspect material (e.g. Meek's 'Misima' material) and to the frustration of science that results from the loss of archival material (e.g. the ill-considered destruction of many of Rothschild's papers).

Letters: Dannefaerd on the Giant Chatham Island Rail

The Giant Chatham Island Rail *Diaphorapteryx hawkinsi* is only known from fossil bones first collected in 1892 by W. Hawkins (for whom the bird is named). However, a letter (from Auckland, dated 21 February 1895) held in the Rothschild Correspondence archive at the Natural History Museum, London, from Sigvard Dannefaerd to his employer Walter Rothschild, includes unique observations on the living rail and other bird species that Dannefaerd gleaned second-hand during a visit to the native Chatham Island Morioris. The Giant Rail became extinct before the arrival of Europeans in the mid-1800s, but obviously coexisted with the Moriori for some time. However, the abundance of its remains in Moriori middens indicates that it was frequently hunted as food, an interpretation corroborated emphatically by the information in Dannefaerd's letter. A full description of the letter and its significance is being prepared by Joanne Cooper of the Natural History Museum, Tring, as part of a wider survey of Rothschild's Chatham island collections. There is an artist's reconstruction of the Giant Chatham Rail in Gill & Martinson (1991: Figure 18), and a complete skeleton of a bird collected by Dannefaerd for Rothschild was illustrated in Andrews (1896: plate XII).

- Western Australia.
- Gilbert appears to have returned to the coast after this date.
- JULY 27 1839
 "Cuculus" collected near Fremantle (BMNH AR).
- AUG 1 1839
 "Meliphaga" collected at Fremantle (BMNH AR).
- AUG 10 1839
Macropus eugenii collected on Garden Island, Mouth of the Swan River (BMNH AR).
- AUG 18-22 1839
 According to a letter from the botanist James Drummond to Dr John Hooker (see Whittell 1941: 123; 1949: 38), between these dates Gilbert went to Rottnest Island with Dr Walker (Surgeon George Grey's 2nd Overland Expedition), James Drummond and the German collector Johann Pfiess.
- AUG 30 1839
Majurus pectoralis collected near Perth (BMNH AR).
- SEPT 3 1839
 Gilbert wrote from Perth to Gould in Sydney on this date. He had tried to get a passage on the *Elizabeth* for Sydney but the captain would not take passengers. He had increased his collection to 530 bird specimens from 150 species; he also had species of mammals, 70 skeletons, 7 bottles reptiles, a few insects, 400 shells, a few crustacea, 3 or 400 plants etc.
- SEPT 4 1839
 "Myzocophala pectoralis" apparently were collected near Toodyay, WA (BMNH AR). However, it would seem impossible for Gilbert to get to Toodyay the day after writing a letter in Perth, and in view of this and the following entry for September 15th, I am assuming the entry of the 4th in the register must be in error.
- SEPT 13 1839
 "Majurus pectoralis" collected on "the Banks of the Darling River" (south-east of Perth) (BMNH AR).
- SEPT 30 1839
Urolithinus mathewsi collected near Northam (BMNH AR).
- SEPT 30 1839
 "White throated Creeper" collected near Northam (BMNH AR).
- SEPT 30 1839
 "Leda pacifica" collected at Northam (BMNH AR).
- SEPT 30 1839
Meliphaga v. virescens collected near York (BMNH AR).
- SEPT 30 1839
Petrochelidon ariel collected at Northam (BMNH AR).

Figure 2. Part of John Gilbert's itinerary in Australia, reconstructed from specimen labels, letters, diaries and published accounts (from Fisher 1992, © NMG).

This is not the only scientifically interesting letter amongst Dannefaerd's correspondence, which is also greatly revealing about how extensive Dannefaerd's previously unrecognised contribution to Rothschild's fossil collection was.

Letters and field labels: Gould, Gilbert and the Paradise Parrot

The Paradise Parrot *Psephotus pulcherrimus* was first collected on the Darling Downs of southern Queensland by John Gilbert, John Gould's collector in Australia, in May 1844. Gilbert wrote to tell Gould about his new bird, which is now thought to be extinct (Brooks 2000). The story of Gilbert's discovery is now known only because of the finding of two letters, the first in 1938. This was a draft¹ of Gould's reply to Gilbert's letter, found in an old trunk belonging to Gould's descendants. In this letter Gould exclaimed 'I am especially delighted about the new *Platycercus*...'

Since then it has been suspected that Gould had used Gilbert's account, as contained in his original, but lost, letter, to help compose the type description of the Paradise Parrot (Gould 1845). Luckily, a copy of Gilbert's original letter was quite recently found in Liverpool City Libraries² (Fisher 1985) (Fig. 3). The copy was by the 13th Earl of Derby, an ardent amateur ornithologist, to whom Gould was hoping to sell some specimens of this spectacular new parrot—hence he had obviously lent Gilbert's letter to Lord Derby as an encouragement. Lord Derby was an inveterate copier of letters (many into copybooks, although this copy is loose) but was not always punctilious about returning them. It seems he never sent the original of Gilbert's letter back to Gould and it cannot now be found. This means Lord Derby's copy is the only record of the collection of the first specimens of this now extinct species, and confirms that Gilbert's description in the letter was used by Gould for the type description. In fact, most of the type description was lifted word-for-word from Gilbert's letter, as this extract demonstrates:

I ... seize the opportunity of writing to you a few observations... almost the first bird shot is a totally new parrot...without exception the most beautiful of the whole tribe I have ever yet seen in Australia... the mingling of the beautiful shades of green, is its most conspicuous and beautiful character... it is in habits truly a grass-eating Parrot, assembling in small families and feeding in high grass...

Gould succeeded in selling two of Gilbert's specimens of the Paradise Parrot to Lord Derby. Both still have Gilbert's original field labels attached to them³. The hand-written collecting date on the label attached to one of these specimens predates Gilbert's letter. This bird, a fine male⁴, must therefore be considered to be from the original type series. The fact that it still has Gilbert's original label (Fig. 4) gives us locality detail missing from the designated type specimens in the Academy of Natural Sciences, Philadelphia, as most of these have had their original field labels removed. Gilbert's letter and label details, coupled with research which has pinpointed Gilbert's route and dates as he travelled through the Darling Downs (see 'Itineraries' and 'Diaries'), means that the original location of the discovery of the Paradise Parrot can now be accurately recorded.

This shows how imperative it is for specimen labels to be carefully looked after. National Museums & Galleries on Merseyside (NMGM), recognising this fact, have started a programme of conserving bird skin labels, which are cleaned, mended and encapsulated in plastic sheaths before being re-attached (see Fig. 4). The conservation project is being undertaken by Paper Conservation staff of the Conservation Centre Division of NMGM, in conjunction with their Organics Conservation staff, who

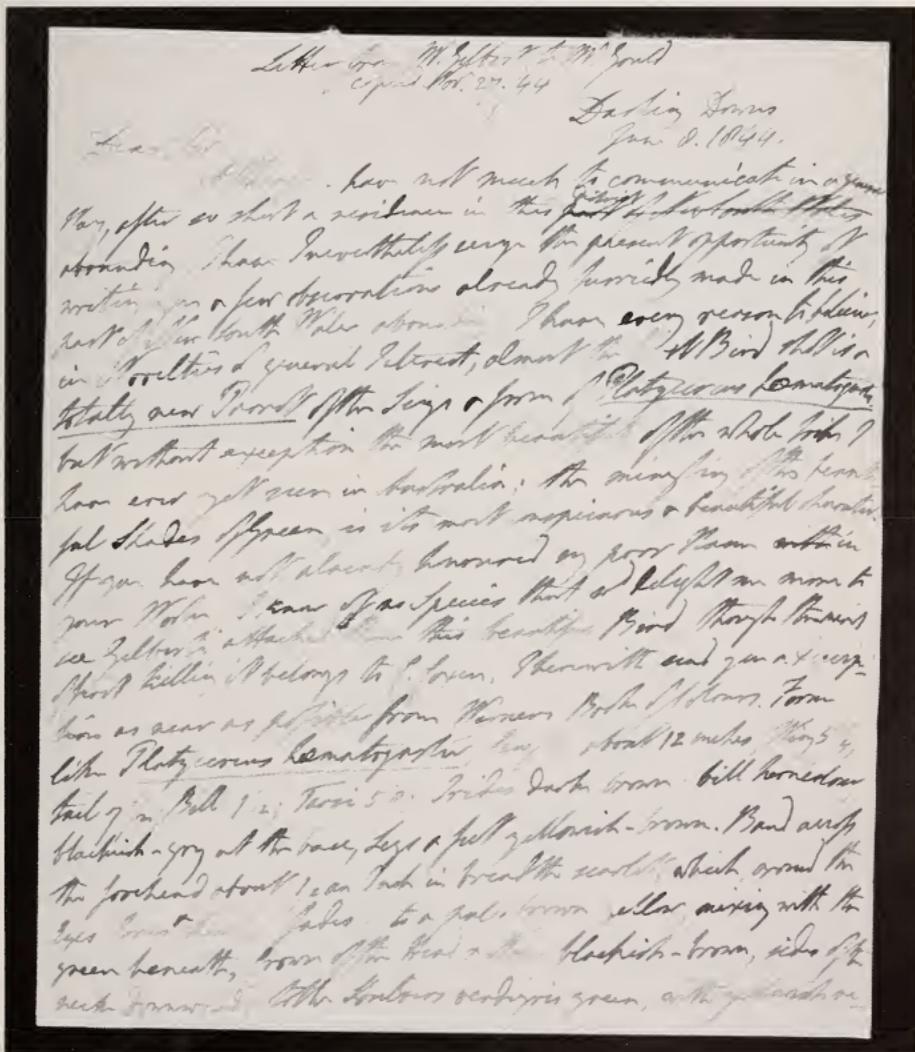


Figure 3. First page from Lord Derby's copy of John Gilbert's letter, in which Gilbert told John Gould about the discovery of the Paradise Parrot (© Liverpool City Libraries).



Figure 4. Labels on Liverpool Museum's paratype of the Paradise Parrot, which include Gilbert's original collecting label. Note that all the labels have been encased in protective plastic (© NMGm).

first repair the cabinet skin. In addition, they insert a dowelling rod into the skin to make a stronger base not only for the body, but for the attachment of legs and labels; these can be tied to the rod and extra stability provided by winding cotton round the legs and through a small drilled hole.

Diaries: Gilbert on the Leichhardt Expedition 1844–1846

The discovery of the Paradise Parrot can also be used to illustrate the importance of daily diaries, which were often kept by naturalists and explorers. Practically all that is known about the range of the Paradise Parrot in the 1840s has been extracted from the labels on John Gilbert's specimens and from remarks he made in his diary, begun during his solo expedition through the Darling Downs area from May 1844. His diary continued after he joined the Second Leichhardt Expedition. The expedition members aimed to cross Australia from southern Queensland to Port Essington, on the north-west coast; Gilbert was a member of the expedition from October 1844 to June 1845, when he was killed by Aborigines in northern Queensland (Fisher 1985).

The Paradise Parrot is first mentioned when Gilbert collected specimens in the Condamine River area of the Darling Downs, but he also noted the bird several times in his diary as the Leichhardt Expedition travelled north through Expedition Range and up the Comet River. His last recorded sighting of it was in June 1845 at the Mitchell River, over 600 miles north of the Darling Downs, just before he was killed (Chisholm 1945, Fisher 1985). These diary entries extend the known range of the Paradise Parrot much further to the north than would otherwise have been suspected, and give conservationists a better chance of rediscovering this beautiful species, which was last seen in the wild in 1927 (Schodde & Tidemann 1986).

Gilbert's diary is very difficult to read (Fig. 5), but it is remarkable that it survived at all. It was eventually returned to John Gould by Ludwig Leichhardt after the rest

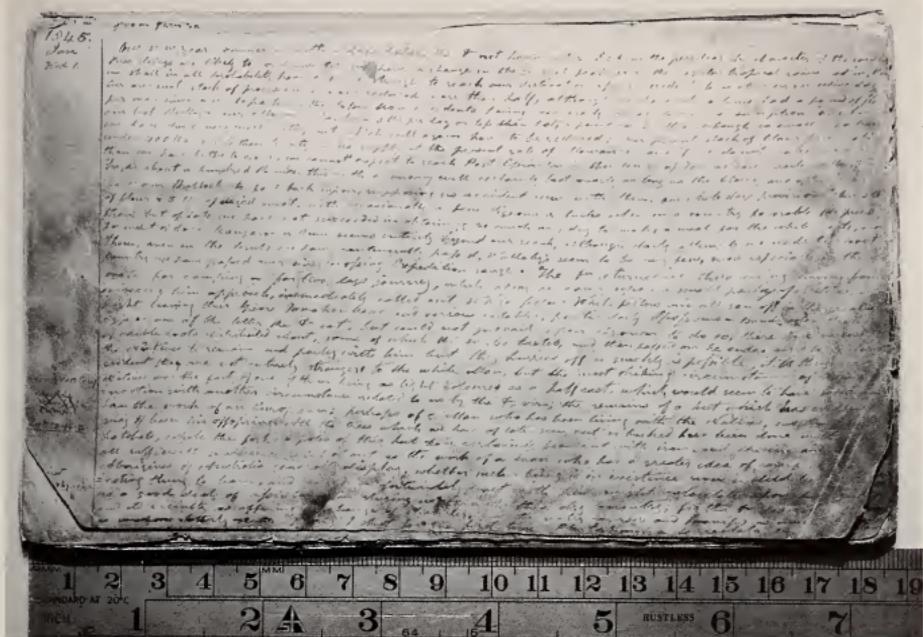


Figure 5. Page from Gilbert's diary from the 2nd Leichhardt Expedition. This includes details of birds he prepared as skins, information which is not always on their labels (© Mitchell Library, Sydney).

of his party, near starvation, finally reached the north-west coast. Gould never read Gilbert's diary properly, but it was passed down to Gould's descendants. It was eventually rediscovered by Australian journalist Alex Chisholm in 1938 (Chisholm 1945) and is now in the Mitchell Library in Sydney⁵. It is presently being transcribed for publication, with Gilbert's comments on the birds he collected being matched (where possible) with the specimens that survive in several museums. This is only possible because many of these specimens still bear Gilbert's original field labels.

Compilations: the Whistler-Ticehurst notes, and the Great Auk Scrapbook

Natural historians interested in their subjects sometimes compile scrapbooks or working collections of notes. These often include unpublished material, or material that would otherwise most probably have been missed.

Hugh Whistler and Claud Ticehurst compiled a huge collection of notes and illustrations for a proposed book on the birds of India, a project never fulfilled owing to their untimely deaths. They tried to gather together all the available information, which involved cutting and pasting published information and adding remarks of their own. The compilations were extensively used by Ali & Ripley in their own ten-volume *Handbook of the birds of India and Pakistan* (1968–1974). They did not use all the information, however, and much unpublished material remains amongst

1779

No. 1227

Pallas' Fishing Eagle *Haliaeetus leucoryphus* (Pall.)

<u>Jeogyeon Dist 1911-1912</u>	
August	12 Two seen at the same time.
	20 One above pair seen again, and their eggs found in almost the last tree of the bridge bend - a huge structure, which was empty.
October	10 Both birds about the eggs; there is a second nest in the next tree.
	29 Bird seen to go up to the larger nest and found that a little green grass & Shekhan leaves had been put in by way of lining.
November	19 Several about Chigalli; that nest with 8 eggs (for description see p. 64 of notebook).
	22 An orderly sent to examine the nest of the 29 th Oct. which contained 2 eggs one of which he brought to me.
	28 I went to the nest and took 2 eggs from it (9% w. all); both birds flew round around the nest while it was being robbed & sat on neighbouring trees, but made no attempt to attack the climber. One of the birds uttered a few Soreamas. The nest contained a few green Shekhan leaves, & it was 2 animals dead & dry which on four or 5 birds indicated the climber was under forenoon.
January	5 The above pair had already half-completed a new nest in a Shekhan tree half-way up the bend, some 100 yds from the old nest. While I was looking one of the pair (♂?) flew off with a long streamer of dry brush grass held in his claws - flapping out behind, but seeing us he went on without alighting. The female was at the nest when we arrived.
	12 One egg in the above nest (for description see p. 66 of notebook).
February	8 Noted at Sagelka.
	<u>Gujranwala Dist. 1910.</u>
	1223. Pallas' Fishing-Eagle - <i>Haliaeetus leucoryphus</i> (Pall.)
	Occurs and breeds in the district, but I had no opportunity of visiting its haunts.
May	14 "One seen from boat by Elizabeth Mullan."
	<u>Luthiana Dist. 1912.</u>
September	1 1 at Larhwal.
	<u>Attuck 1926.</u>
March	7 Nest with a well feathered chick on a huge tree by the Indus.
	<u>Amala Dist. 1915-6</u>
	Pallas' Fishing Eagle - <i>Haliaeetus leucoryphus</i> (Pall.)
	Observed at Ghaggar at Mubariqpur on 19th February, and at Jhagar on 20th March. I also found a pair nesting in a large Fopul tree at Jhagar on the 18th December, and ascertained that the nest contained two eggs, one added, and one hard-set.
	<u>RawalPindi 1926.</u>
January	12 One on a Shekhan tree beyond hi-Sokhan, apparently trying to break off sticks.

Haliaeetus leucoryphus

1779 1227

of 1/1st. one on banks of Jeogyeon; well known as 'Kot' to Shekhan' with no other description.
 It nesting etc. in a small tree.
 4/1/22. one at Chabki.
 3/4/22. 1 seen at Chabki.
 20-21/12/22. Several along river between Muzpur & Indaura 10 yds or 20 fms.
 22/1/23. one at Sairat.
 27/1/23. 1 between Sairat & Muzpur.

Figure 6. A page from the Whistler-Ticehurst notes, with information on Pallas's Fish Eagle *Haliaeetus leucoryphus* (© The Natural History Museum, London).

the Whistler–Ticehurst manuscripts. These are still used by visiting naturalists using the Ornithology Library at Tring, where they are now kept (Fig. 6). The page illustrated also shows the damage that rusting metal pins cause to manuscripts; librarians now use plastic, or plastic-coated, paper clips.

The Great Auk Scrapbook is an unpublished single-copy compilation, originally from the library of Colonel Hanbury Barclay, who made a handwritten index of the contents. In 1911 the scrapbook was sold at auction and it passed into the possession of Thomas Parkin, who continued the collection of printed papers, and added letters, press-cuttings and photographs concerning sales of Great Auk *Pinguinus impennis* relics. The Natural History Museum purchased the scrapbook in 1961⁶. This collection of published and unpublished snippets on the Great Auk has proved very useful to many researchers (Fig. 7).

Annotated catalogues and associated manuscripts: Sharpe and Darwin

Staff at the Natural History Museum have been trying to match all Charles Darwin's bird specimens that are now in their collections against his original field notebooks. The museum's published bird *Catalogue* (Sharpe 1881: 244–245) lists their specimens of Sedge Wren *Cistothorus platensis* from the Falkland Islands. However, the annotations in the working library copy of this catalogue at the NHM's outstation at Tring⁷ are much more revealing than the printed text, as details of several specimens have been added in manuscript in the opposite margin. These skins had been added

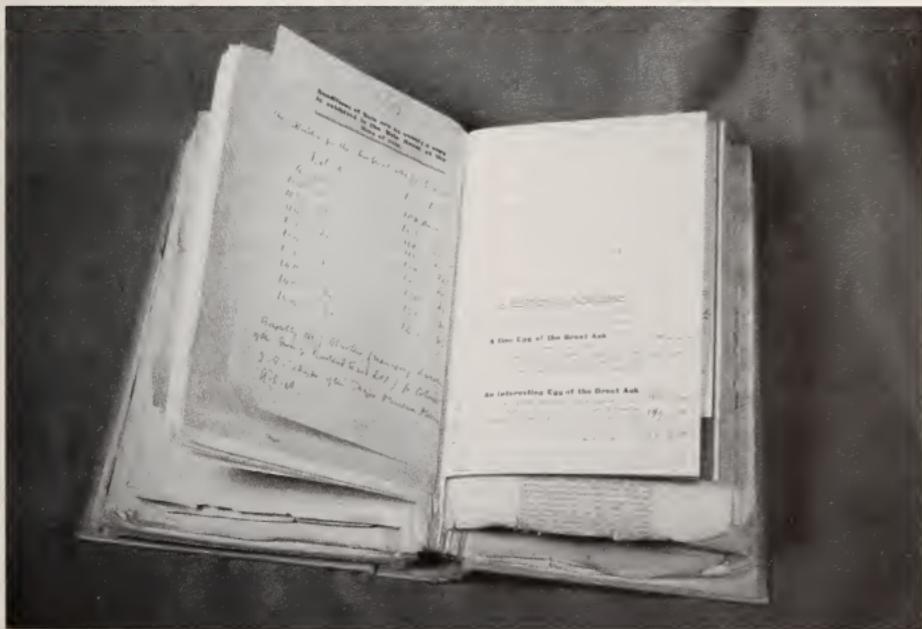


Figure 7. The Barclay-Parkin Great Auk Scrapbook (© The Natural History Museum, London).

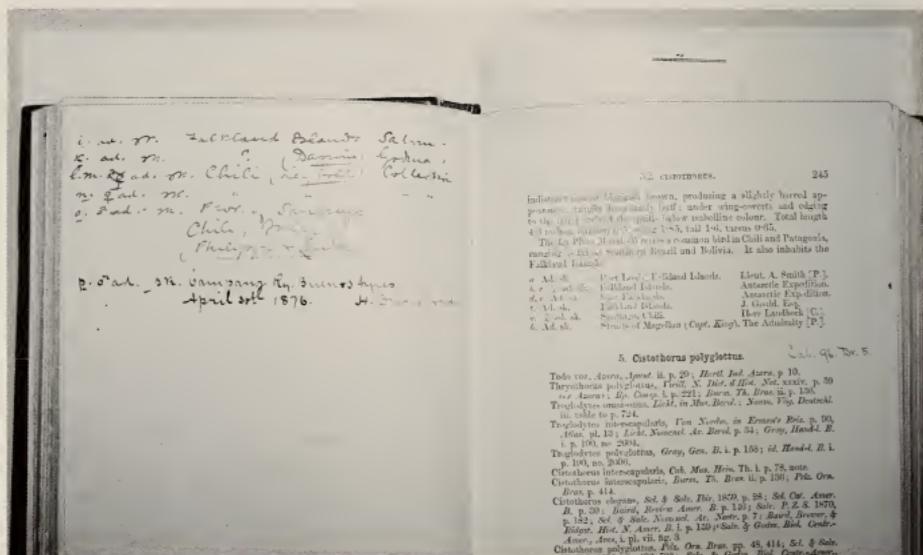


Figure 8. Manuscript annotations detailing additional specimens of *Cistothorus platensis*, opposite the printed list on Sharpe (1881), page 245 (© The Natural History Museum, London).

to the NHM collections after the publication of Sharpe (1881). One of these annotations reads: 'K. ad m. ? [presumably for unknown locality]. Darwin. Godman [= Godman-Salvin Collection]' (Fig. 8). This refers to specimen NHM 1885.3.6.480, which indeed gives very little information on the attached label. However, on cross-referencing against Darwin's Red Notebook (which is in the Fitzwilliam Museum at Cambridge, and has long been known to contain collecting details about his specimens), there are actually good field data for this specimen: '1053 B X Sylvia Falkland Islands ... lives in the coarse herbage, close to the ground ...' (Fig. 9). Thus the bird can now be relabelled with the correct location and with additional ecological detail.

Eggs and texts: Popham and the Curlew Sandpiper, and eagle eggs

The impossibility of attaching a label to an egg means that clutch cards and diary entries are crucial to the maintenance of key data on egg collections. Labels placed in the box with the clutch (or clutches) are easily lost or misplaced. Usually a small clutch code written on the egg is the only way to link it to the clutch card and its data.

Hugh Popham (1864–1943) found the first authenticated nest-site of the Curlew Sandpiper *Calidris ferruginea* in 1897; these eggs and their clutch card are now in the NHM. His diaries were presented to the NHM in 1947, four years after the

March		Falkland Islands	
1046	B X	Emberiza. Falkland Islands [note opposite] I have seen these two constantly in the same flock.— They are by far the commonest land-bird in the Island.— [listed as <i>Chlorospiza melanodera</i> in <i>Zoology</i> 3:95-6]	✓
1047	B	do (not shot with the last, but perhaps it is the male)	
1048	B	Scolopax Falkland	
1049	I	Coleoptera. Tierra del F, chiefly Hardy Peninsula	
1050	I	Harpalidæ. Falkland Island	
1051	I	Ricinus from Scolopax (1048)	
1052	P	Lichen common in mountain on the rocks. Tierra del F.	
1053	B X	<i>Sylvia</i> Falkland Islands [note opposite] Beak & legs large in proportion. lives in the coarse herbage, close to the ground:— [with different pen] I never saw a bird so difficult to make to fly after marking it down within a few yards in open plain it could never <illeg.> [listed as <i>Scytalopus</i> = <i>Troglodytes Magellicanus</i> Gray in <i>Zoology</i> 3:74; and see <i>Ornithological Notes</i> p. 213]	✓
1055	P	Excrescences or Fungi; edible; on the Beech same as in spirits (528) [<i>Cyttaria darwinii</i> . See <i>Plant Notes</i> p. 168]	
1056	P	Junctions of Parasite bush with the Beech of Tierra del F. same as in spirits (532-534)	
1833 March			
1057	I	Moth. on leaf of Black Currant bush. G. Success B.	
1060	I X	Harpal: (Sphodrus?) Falkland Island [note opposite] Was this insect imported or is it an original inhabitant	
1061	I	Harpal; abundant near coast. Falk: Isl.	
1069	S	Marine Shells. Wollaston Island & G Success Bay: the Balanus with crenated sections coats all the rocks at low water	

Figure 9. Page from the printed version of Darwin's Red Notebook, which includes information on '*Sylvia, Falkland Islands*' (= *Cistothorus platensis*) which does not exist on the specimen's label (© Fitzwilliam Museum, Cambridge).

eggs⁸. The clutch card reads: '*Calidris ferruginea*. Korsakoffski Is. Yenesei R., Siberia. [Collector] H. L. Popham. 3 July 1897. [Set Mark] 387. [No. of eggs] c/4. Shot bird off nest, notebook vol. I, exhibited B.O.C. 20.10.97 [see *Bull. B.O.C.*, 7 (1897): 2]; first authentic eggs on record' (Fig. 10).

The clutch card therefore includes information cross-referenced to one of Popham's original diaries, but these would not have been available to NHM staff when they first received the eggs. Popham's diary indeed has a long entry describing his discovery and collection of the contents of the Curlew Sandpiper nest, and also recounts how he collected the female parent. Of the eight Popham Curlew Sandpiper skins in the collections at Tring, three have their legs, with attached labels, detached. Popham's skinning technique obviously involved cutting the legs inside too low down the bone shaft, and not tying the bones together inside; thus the legs eventually fall out of the body. One of the three birds with detached legs is the female shot off the nest on 3 July 1897⁹, but which one of the three skins belonged to which legs will now be impossible to say until genetic testing is more refined (and affordable). This situation underlines the importance of keeping legs—and thus labels—attached to birds, by repairing them, or in the immediate future by individually bagging each skin.

By the very nature of egg collections, where many have been illegally taken, data are encrypted, and clutch cards and diaries are often kept far away from the eggs to avoid prosecution, it is often worth waiting—often for years—for missing

information to turn up. A clutch of White-tailed Sea Eagle *Haliaeetus albicilla* eggs, now at the National Museum of Scotland (Fig. 11), is labelled in ink as having been collected at Ardnamurchan on 7 May 1874 and were apparently without further data when the private collection they were in was confiscated by the RSPB¹⁰. The collector's diary¹¹ was given to the NMS by a completely separate source at a later date and gives a more detailed account of the collection of these two eggs (Fig. 12): '... Simon Ross took a nest situated on the cliffs overhanging the sea on the farm of Grigadale about 2 miles south of the lighthouse and Point of Ardnamurchan ...'.

Captive breeding records and studbooks: the first Budgerigar and Smalley's pigeons

The first Budgerigar *Melopsittacus undulatus* to be hatched in captivity in Britain was the subject of a letter in 1848 from the 13th Earl of Derby to John Gould. Gould had imported the parent 'Sparrow Parakeets' from Australia for Lord Derby, for his aviaries at Knowsley Hall, near Liverpool. In 1840 Gould had been the first person to import live budgerigars successfully from Australia to Britain. Lord Derby's letter to Gould (Fig. 13) recorded that:

I have the pleasure to tell you we have been overjoyed here by the fact of a Pair of the *Melopsittacus undulatus* breeding. It was first observed by Thompsons



Figure 10. Popham's diary, open at the page where he recorded that he had shot a parent Curlew Sandpiper off its nest in Siberia on 3 July 1897. The picture also shows the eggs from this nest, the clutch card, and four Curlew Sandpiper skins collected by Popham (© The Natural History Museum, London).

any offspring of them in confinement. I have
 the pleasure to tell you as has been our
 friend here by the post of a Pair of the
 Redpolls and, before breaking it was
 full of news by Thompson writing that the
 American kept the hole she had taken
 to, but was regularly fed there by the male.
 At least the possession of the hole was the
 ready attention he expressed the couple
 he went holding but as both had
 my effort of ... could form it in
 my property had not been to disturb her
 if it be so. It is all well here and
 they more than that she certainly has
 for he can hear the young. but this may
 or was all wrong. This is curious
 and I believe that ... I think they
 may go on well but we will hope!
 more than before.

Figure 13. Extract from a letter from
 the 13th Earl of Derby to John Gould,
 dated 11 February 1848 and recording
 the hatching in captivity of
 Budgerigars, for the first time in
 Britain (© The Natural History
 Museum, London).



Figure 14. A Budgerigar chick, from
 the first pair to be hatched in captivity
 in Britain (at Knowsley Hall, in 1848)
 (© NMGM).

noticing that the hen never left the hole she had taken to ... we can hear the young ...this is curious and I believe the 1st instance¹².

The two young birds unfortunately died soon after hatching, but one is preserved in the collections of the Liverpool Museum, complete with a label recording when it died¹³ (Fig. 14).

Two manuscript volumes representing Smalley's pigeon studbook (1904) refer to domestic pigeon varieties represented by specimens now in the collections at the Natural History Museum, Tring, and give details of plumage and lineage which are not on their labels¹⁴ (Fig. 15). Although it might not seem that storing information on captive birds is an important part of a museum's remit, such information is often sought by aviculturists and historians and is an inviting topic for the general public. The Liverpool Museum budgie, for instance, was by far the most popular and most photographed exhibit out of all the hundreds of specimens and works of art in a recent exhibition about the 13th Earl of Derby.

Incidental biographical material

An incidental part of working with paper is the occasional fleeting insight it may grant into personal circumstance and social history. Manuscript bird labels are often recycled backs of calling cards, entrance tickets or invitations. Many of John Gould's specimens, for instance, are labelled on the back of strips cut from the entrance tickets to his 1851 Hummingbird exhibition at Crystal Palace in London. This also can be useful in dating his specimens. Figure 16 shows a Royal Society invitation to Burlington House for the eminent ornithologist Canon Tristram 'and a Lady'. This invitation was reconstructed from the reverse side of bird skins labels in the National Museum of Scotland (Fig. 16).

Figurative material

Illustration, first by drawing and more recently also by photograph, has been a crucial means of conveying information about species and indeed their habitats. However, in much the same way that specimen material is often simply archived in a museum collection without being published (see Collar & Rudyanto 2003, this issue), so it is with figurative material, and with the same result—that there is often a great deal of important information to be discovered through the examination of these types of record.

Illustrations of extinct species, 1: the Pink-headed Duck

The Impey Collection (1774–1783) contains exquisite gouache paintings, of which about 120 are thought to survive, executed by artists trained in the Moghul tradition. They are mainly portraits of birds which lived in captivity in the gardens created in Calcutta by Lady Impey and her Chief Justice husband, Sir Elijah Impey. Many of these paintings were the first known records of particular species of bird and, after

"horouchi" }
 68 Blue cheq. cock (39) }
 "Pansy" }
 67 Blue cheq. hen (38) }
 "David" }
 66 Blue cheq. cock (37) }
 "Violet" }
 60 Blue cheq. hen (27) }
 "Blue cheq. cock (60)" }
 "Blue cheq. hen (61)" }
 "Blue cheq. hen (62)" }
 "Blue cheq. hen (63)" }
 "Blue cheq. hen (64)" }
 "Blue cheq. hen (65)" }
 "Blue cheq. hen (66)" }
 "Blue cheq. hen (67)" }
 "Blue cheq. hen (68)" }
 "Blue cheq. hen (69)" }
 "Blue cheq. hen (70)" }
 "Blue cheq. hen (71)" }
 "Blue cheq. hen (72)" }
 "Blue cheq. hen (73)" }
 "Blue cheq. hen (74)" }
 "Blue cheq. hen (75)" }
 "Blue cheq. hen (76)" }
 "Blue cheq. hen (77)" }
 "Blue cheq. hen (78)" }
 "Blue cheq. hen (79)" }
 "Blue cheq. hen (80)" }
 "Blue cheq. hen (81)" }
 "Blue cheq. hen (82)" }
 "Blue cheq. hen (83)" }
 "Blue cheq. hen (84)" }
 "Blue cheq. hen (85)" }
 "Blue cheq. hen (86)" }
 "Blue cheq. hen (87)" }
 "Blue cheq. hen (88)" }
 "Blue cheq. hen (89)" }
 "Blue cheq. hen (90)" }

35. C. e. l. s. from Norway & Stewart from Dublin. Apr. 1905.
 70. C. e. l. s. from ...
 71. C. e. l. s. from ...
 106. Hen. ...

MEMORANDA.

Year	Sex	Name	Parents	Notes
1902	COCK	1902	Blue chequer (10)	
1902	HEN	1902	Blue chequer (58)	
1905	COCK	1905	Blue chequer (35)	
1905	HEN	1905	Blue chequer (35)	
1905	COCK	1905	Blue chequer (106)	
1905	HEN	1905	Blue chequer (106)	

Figure 15. A page from Smalley's Pigeon Studbook, showing details of hatching and lineage (© The Natural History Museum, London).



Figure 16. Invitation from the Royal Society to Canon H. B. Tristram, reconstructed from the backs of bird labels at the National Museum of Scotland (© The National Museum of Scotland).

the Impeys had returned to Britain with their pictures, were used extensively by the distinguished English ornithologist John Latham to describe forms new to science.

Two of these 'iconotypes', both by Shaikh Zayn-al-Din, are described below, and were from a group of four Impey paintings recently purchased by NMGM (Fisher 1999)¹⁵. Another fine painting from this group is by the Moslem artist Ram Das. It was purchased on the grounds that it is probably the earliest known portrait of the Pink-headed Duck *Rhodonessa caryophyllacea* (Latham). This duck has not been seen since the 1940s and is probably, but not certainly, extinct (BirdLife International 2001). Latham (1787, supplement 1: 276) stated that the duck 'Inhabits various parts of India ... [and] Is often kept tame ..'. The painting by Ram Das was almost certainly painted using a living model, and as such this composition is of great interest and importance (see Fisher & Kear 2002).

Illustrations of extinct species, 2: Lieutenant Robins's Macaw

A spectacular and interesting painting (Fig. 17) by a Lt. L. J. Robins has recently been discovered in a private collection, in a bound volume of works dated 1765¹⁶. The volume is entitled *The natural history of Jamaica*, but the bird does not match very well with the description of the only known specimen—shot near Lucea in 1765 (Gosse 1847)—of the Jamaican (or Yellow-headed) Macaw *Ara gossei*, a species which is sadly no longer extant. In Joseph Smit's plate in *Extinct birds* (1907), which



Figure 17. Macaw, from a volume of paintings entitled *The natural history of Jamaica* by L. J. Robins (© The Earl of Derby).

accompanies Walter Rothschild's quotation of Gosse's account of the Jamaican Macaw (and from which Rothschild took his 1905 type description), the bird clearly has a yellow crown, whereas Robins's Macaw seems only to have a yellow crest; nor does Robins's Macaw seem to match the plumage of the now-extinct Cuban Macaw *Ara tricolor*.

Illustrations of extinct species, 3: the Great Auk

This species, which became extinct in the 1840s, is known from mounted specimens, eggs and osteological material. However, much of its ecology and behaviour, as well as the story behind the bird's extinction, has been deduced from written accounts



Figure 18. Painting of a New Zealand Laughing Owl, by an unknown artist, from the Rothschild Library at Tring (© The Natural History Museum, London).

and from old pictures. One such old drawing is an engraving (see Fuller 1999: 65) from Newfoundland by F. W. Keyl and E. Evans, produced in about 1880, which gives a very strong impression of the hunting techniques used for the mass dispatching of the flightless bird.

However, probably the earliest drawing of the Great Auk known is one that not only proves that the bird occurred on the Isle of Man but also suggests that it bred there. The drawing (reproduced in Williamson 1939, Fisher 1997, Fuller 1999: 367) is by Daniel King and dated about 1652. It is captioned 'These kind of birds are about the Isle of Man', and shows a Great Auk standing on a flat rock, which were their usual breeding sites. Other contemporary accounts record the species on the Isle of Man, and some pieces of bone excavated at two archaeological sites on the island—Perwick (Garrad 1972) and Castletown (Fisher 1996)—have confirmed its presence there.

Illustrations of extinct species, 4: the New Zealand Laughing Owl

The Laughing Owl *Sceloglaux albifacies* was first named by George Gray in 1844 from a specimen from the voyages of the ships *Erebus* and *Terror*. He was struck with the white face of the specimen, hence *albifacies* (= 'white-faced'). Later, specimens with rufous faces (which may be colour morphs) were collected.

This species has been extinct since 1914, and is only known from about 30 specimens. Only two paintings of the bird exist which appear to be done from life: one by J. G. Keulemans in Rowley's *Ornithological miscellany* (1875, vol 1: opp. p.35), painted from Rowley's own captive specimens, and a painting now in the Rothschild Library at Tring, which was done by an unknown artist. The few other pictures of the Laughing Owl show it upright, but in this last painting it has a sideways, hunched stance (Fig. 18). The painted tail has been much changed, from thick to thin. Rothschild had this picture up on his wall in his museum at Tring for many



Figure 19. *Rallus nigra* from "Otheila" (= Tahiti), by George Forster (© The Earl of Derby).



years, so he obviously thought it was special. It may have been of the live specimen he had in confinement in Cambridge, in which case the painting was probably done from life. This Cambridge bird is now in the collections of the NHM at Tring.

Figure 20. Lord Howe Island Pigeon, by George Raper (1790), from the Raper Drawings at the Natural History Museum (© The Natural History Museum, London).

Illustrations of unknown species, 1: the Tahiti Black Rail

An original watercolour (now in private hands¹⁷) of a rail named *Rallus nigra* was published in 1784 in *Icones animalium* by the artist John Miller, but without locality. It was therefore supposed to be either a picture of the Henderson Island Rail *Porzana atra* ('*Nesophylax ater*'; as synonymised in Peters 1934, 2: 188), or an earlier version of George Forster's picture of *Porzana tabuensis* (which is from Tahiti and neighbouring islands). Thus it was recommended that the name *Rallus nigra* be suppressed. However, the original watercolour is clearly marked 'Otheila (= Tahiti). Dr Forster' (Fig. 19) and the bird does not look like *Porzana tabuensis*. Michael Walters of NHM (who has been analysing this picture) thinks that *Rallus nigra* was probably more closely related to *P. atra* but was a distinct species that once lived on Tahiti. It would be useful to discover some fossils to prove this theory.

Illustrations of unknown species, 2: the Lord Howe Island Pigeon

There are only two known portraits of the Lord Howe Island Pigeon *Janthoenas godmani*. One is amongst the collection of George Raper's drawings in the NHM¹⁸ and is dated 1790. The other (which is almost identical and is probably a copy of Raper's picture, although the bird is sitting on the ground rather than perched on a branch) is amongst an important collection of paintings¹⁹ produced by an unknown artist in about 1790. This latter picture is reproduced in Hindwood (1940, plate 1). The Raper picture was used by Gregory Mathews to name the species in 1915, and copied by Henrik Grönvold for Mathews's *Birds of Norfolk and Lord Howe Island* (1928) (Fig. 20).

Illustrations that involve taxonomic types

Of the four Impey paintings recently purchased by NMGM (see above), two—both by Shaikh Zayn-al-Din—are almost certainly types (pictures, rather than specimens, to which the author was referring when writing the type description of a new species). The first is entitled 'Bhu'khur' (= 'Cuckoo')²⁰ and was painted in 1782. This shows the Little or Asian Lesser Cuckoo *Cuculus poliocephalus*, which was given this scientific name by Latham (1790, I: 214). Latham stated that he founded his scientific name on the 'Grey-headed C[uckoo]' of his *General synopsis of birds* (1787, Supplement I: 102), where he reported that his description was based on a bird in one of Lady Impey's collection of drawings. This must be the drawing he was referring to. Shaikh Zayn-al-Din's painting therefore has type status for the name *Cuculus poliocephalus*.

Another of the four Impey paintings recently purchased by NMGM is a delightful portrait of a 'Syam Chakar' ('Siam Nuthatch') on what appears to be a cinnamon tree (Fig. 21)²¹. We are fairly sure that this portrait is the basis of Latham's name *Sitta longirostra* (1790: 264; the 'Long-billed Nuthatch' from 'Batavia'), which Peters (1967: 142 footnote) reported to be 'not identifiable'. James Greenaway, who wrote this footnote, did not have the luxury of seeing Shaikh Zayn-al-Din's portrait of the bird, which was in private hands at the time, nor had he traced Latham's latinised description back to the *General synopsis of birds* (Supplement Part I: 118, 1787) or to *A general history of birds* (4: 73). In both these accounts Latham states that he was describing his Long-billed Nuthatch 'From the drawings of Lady Impey'. The plural 'drawings' is interesting; it could be construed that there was more than one of this nuthatch. Indeed, the Impey 'Syam Chakar' at NMGM is actually more probably a syntype, because several of the Impey drawings seem to be duplicates of the same species, and Latham is likely to have had access to all the paintings, including the duplicates.

A very similar painting of a nuthatch is in a bound volume of original paintings in the Rothschild Library at the NHM, Tring, entitled *Indian birds coloured*²². For a long time the artist, or artists, responsible for the illustrations in this volume remained unidentified. In recent years a Farsi-speaking visitor translated some signatures as 'Sheikh Ed-dine'. On comparing the two nuthatch paintings, it was confirmed that the Tring picture was another original by Shaikh Zayn-al-Din (Fig. 22). The only real difference is the way the cinnamon plant on which the bird is perched has been painted. The two pictures are therefore now regarded as syntypes for Latham's name *Sitta longirostra*. However, there still remains the puzzle of which species *Sitta longirostris* actually is equivalent to in modern terms. The fact that 'Syam Chakar' is written on the NMGM version hints that *S. longirostris* could be a Siamese (Thai) species.

Photographs of birds: the New Zealand Laughing Owl and the last Heath Hen

Only a few photographs were ever taken of the now-extinct New Zealand Laughing Owl; two reproduced in *Tyto* 3 (1998: 17-18) were taken in about 1909 by Cuthbert



Figure 21. "Syam Chakar" (Siam Nuthatch), painting by Shaikh Zayn-al-Din, recently purchased by Liverpool Museum, NMGM (© NMGM).



Figure 22. Painting of a nuthatch, by Shaikh Zayn-al-Din, from a bound volume entitled *Indian birds colour* in the library at Tring (© The Natural History Museum, London).



Figure 23. Previously unpublished photograph of a Heath Hen, taken by Alfred O. Gross at Martha's Vineyard on 31 March 1930 (© The Natural History Museum, London). Registration number 654-J-22).

and Oliver Parr. Both show an owl in a small rocky shelter, with a mouse in its beak. The only other photograph is one by Henry Wright of a captive bird, probably one of the pair shipped to Rothschild by Walter Buller in 1892 (this is also mentioned in *Tyto* 3). These photographs are very useful historical records in themselves, but are also valuable in relation to the pose and shape of the Laughing owl in the painting at Tring (see above).

Five excellent photographs were taken of living Heath Hens *Tympanuchus cupido* at Martha's Vineyard, Massachusetts, by Alfred O. Gross in 1929 and 1930, just before the species became extinct. One of these photographs is reproduced in W. T. Hornaday's book *Thirty years war for wildlife* (1931). The rest remain, so far as we are aware, unpublished; prints are in the Ornithology Library at Tring (Fig. 23).

Discussion and conclusions

The examples above indicate the various ways in which material on paper, stored in museums, can serve science well if it is only recognised for its potential value and put to good use. We say 'stored in museums' but the title of our essay acknowledges that with this material there is a great deal of interplay between museums and libraries. Often the libraries are part of the museum (most large collections of birds have their own dedicated library), but sometimes they are, as it were, equal members of a wider institution. Thus, for example, we now have available the notes of H. H. Slater (c.1875) on the birds of Rodrigues, which came to Alfred Newton via his brother Edward as part of a consignment of material sent to the Cambridge University Museum of Zoology. These were tracked down and used by Cheke (1987), but are now in the Newton/Balfour Library in the Department of Zoology at the University of Cambridge and no longer therefore a document preserved in the museum itself. The movement of scripts and illustrations from museum to library is doubtless a common one, and future workers should be aware that events of ostensibly trivial significance at the time (such as the sale or disposal of papers, or the administrative restructuring of faculties and departments) can dissociate documentation from its subject material in such a way as to require considerable extra diligence and scholarship on the part of future interested parties.

The examples we have used in this essay are perhaps rather dramatic and extreme, since for the most part they deal with the very rarest species, or species that are now lost to us. We should also stress that field notebooks, diaries, letters (and so on) can be extremely valuable sources of information about the status of what were, in centuries past, common birds. These manuscripts can, of course, also tell us a great deal about the status of the habitats these birds then occupied. Indeed, their value may become increasingly obvious as biologists and conservationists investigate declines of species that were once so common that their detailed documentation was considered unimportant, with the result that their former status has perhaps only very generally been described in the published literature. If museum archives hold documentation that can more precisely account for the former status of a species, then in due course they are likely to become more and more valuable to researchers.

There are, however, very considerable drawbacks with regard to the status of paper holdings in museums. Two key ones are that (1) most of the material is very little known to museum users and indeed museum staff, and (2) most of it is inadequately indexed for ease of reference; moreover, although this is a separate and less ubiquitous problem, (3) it is often either unavailable, or available in only constrained physical and/or temporal circumstances (thus, for example, A. S. Cheke [verbally 1999] found that, in the 1970s, the correspondence of Alfred Newton—Professor of Zoology at Cambridge University and dead since 1907—was not open for consultation because it was uncatalogued; this embargo lasted until the mid-1990s when the material was transferred to the University Library). We might also add (4) that there are fewer and fewer biologists at present who have the necessary training and *type* of scholarly outlook and interest to make valuable use of paper holdings. In the past, much of this expertise was handed down by day-to-day example, difficult to maintain in these modern times of staff shortages and alternative duties.

As a consequence, museum users are unlikely to make routine reference to such material. Certainly it is the case that a researcher needs to be extremely focused, or obsessed, in order to work through a body of paper holdings in search of particular items of information or pieces of evidence. Nevertheless, there is much that museums can do to improve the situation—by providing more details in a more public manner about their paper holdings (through exhibitions, catalogues, scientific papers, websites), by liaising with other academic institutions and inviting debate about the scholarly study of their materials, and by setting up programmes of cataloguing, indexing and description of holdings. All of this might cost money, but not necessarily great sums, and some of the work could be entrusted to volunteers. We would, at any rate, be inclined to feel that the long-term security of much of the paper-based material in museums would be enhanced by greater clarity and assertiveness over its value as a relevant contemporary research resource in history and biology.

Acknowledgements

We would like to thank the following ornithologists and librarians for their suggestions and help with examples included in this paper: the Javan Lapwing—Nigel Collar, Rene Dekker and Jörn Scharlemann; the São Tomé Short-tail—Nigel Collar; the Giant Chatham Island Rail—Joanne Cooper; the Tahiti Black Rail—Amanda Askari and Michael Walters; the Great Auk—Errol Fuller; Sharpe's *Catalogue* and Darwin—Frank Steinheimer; Popham's diary—Michael Walters and Jörn Scharlemann; the White-tailed Sea-eagle eggs and for Canon Tristram's invitation—Bob McGowan.

We also acknowledge the many hours that Nigel Collar, Jo Cooper and Jörn Scharlemann have spent improving this paper. We are very grateful to the following institutions and owners for permission to reproduce original illustrations or manuscripts: the Rijksmuseum van Natuurlijke Historie, Leiden; the Natural History Museum, London and Tring; the National Museum of Scotland, Edinburgh; National Museums & Galleries on Merseyside, Liverpool; Liverpool City Libraries; the Mitchell Library, Sydney and The 19th Earl and Countess of Derby, Knowsley Hall, Merseyside.

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Footnotes

- ¹ Paradise Parrot letter, see draft and formal letter from Gould to Gilbert, in National Library of Australia, Canberra.
- ² Copy by Lord Derby of Gilbert's letter: LCL 920 DER (13) 1/67/11.
- ³ Both are now in the collections of the Liverpool Museum, NMGM.
- ⁴ LIVCM D.789a.
- ⁵ Gilbert's diary in the Mitchell Library is in two parts, one of which is mislaid and at present only available as a typescript copy. Original volume: ML A2586, typescript ML A2587.
- ⁶ 'Great Auk - Miscellaneous Papers', compiled by H. Barclay and later T. Parkin. NHM (Tring Library).
- ⁷ NHM, Tring; the working copy of Sharpe's Catalogue of birds in the BMNH is kept outside the curators' offices on the first floor of the bird collection building.
- ⁸ Eggs: Popham Collection 1943.7.471. H. L. Popham's journals (Travel Diaries in 7 volumes) are kept in the Library at NHM Tring.
- ⁹ Female Curlew Sandpiper skin, NHM 1938.12.14.91 (collected July 3rd 1897, from the Yenisei River, Popham's collection number 500 [387]).
- ¹⁰ White-tailed Sea Eagle eggs: NMSZ 1991.111.
- ¹¹ Diary in J. J. Dalgleish collection, National Museum of Scotland.
- ¹² John Gould Archive, Zoology Library, Natural History Museum, London.
- ¹³ LIVCM D.505g, died in the Knowsley aviaries in February 1848.
- ¹⁴ Smalley's Pigeon Studbook in 2 volumes, 1903-1913. NHM, Tring Library.
- ¹⁵ Impey Collection LIVCM 1999.36.2-5. These were once in the possession of the XIIIth Earl of Derby, at Knowsley Hall. The Pink-headed Duck is numbered 1999.36.4.
- ¹⁶ Robins's 'The Natural History of Jamaica' in seven volumes, Knowsley Hall Library, NH11 E13-19.
- ¹⁷ Knowsley Hall Library, near Liverpool. Painting by John Miller but pasted on page 12 of a bound volume of paintings mainly by Thomas Davies, NH14 E9.
- ¹⁸ Raper Drawing No.72, Zoology Library, NHM South Kensington. George Raper was a midshipman on the *Sirius*.
- ¹⁹ Painting no. 41 in a collection of original pictures in the Alexander Turnbull Library, Wellington, New Zealand
- ²⁰ NMGM 1999.36.2.
- ²¹ NMGM 1999.36.5. It must have been painted between 1774 and 1783, the period the Impeys were in India.
- ²² 'Indian Birds Colour'd', plate 40, NHM Tring Library.